UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

July 28, 2005

Mr. J. William Vinzant
Regional Environmental Manager
Corporate Environmental Affairs
Kaiser Aluminum and Chemical Corporation
9141 Interline Avenue, Suite 1A
Baton Rouge, Louisiana 70809-1957

SUBJECT: NRC INSPECTION REPORT 040-02377/05-003

Dear Mr. Vinzant:

On May 2, 2005 through June 22, 2005, an NRC inspection was conducted at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The preliminary inspection findings were discussed with members of your staff during the exit briefing conducted on June 22, 2005. Final inspection findings were discussed with the Site Administrator during a telephonic conference call conducted on July 25, 2005. The enclosed report presents the scope and results of that inspection.

The purposes of the inspection were to determine whether decommissioning and remediation activities were being conducted in accordance with the NRC-approved Decommissioning Plan for the Phase II Remediation. Within these areas, the inspection consisted of selected examination of procedures, work plans, representative records, and interviews with personnel as they related to safety and compliance with the Commission's rules and regulations. The inspection included confirmatory radiological surveys of your decommissioning efforts in both the pond parcel area and the Former Operational Area, as well as, confirmatory radiological surveys of concrete slabs for disposition at a local landfill. The results of the confirmatory surveys are provided in the enclosed inspection report. No deviations from NRC commitments were identified and no response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Ms. Beth Schlapper at (817) 860-8169 or the undersigned at (817) 860-8191.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch

Docket No.: 040-02377
License No.: STB-472 (terminated)

Enclosure:
NRC Inspection Report
040-02377/05-003

cc w/enclosure:
Mr. Paul Handa, Site Administrator
Kaiser Aluminum & Chemical Corporation
7311 East 41st Street
Tulsa, Oklahoma 74145

Mr. Doug Wilson
Manager, Environmental Services
Office of Environmental Services
City of Tulsa
4818 South Elwood Avenue
Tulsa, OK 74107-8129

Mr. George Brozowski, Regional Health Physicist
U.S. Environmental Protection Agency, Region VI
1445 Ross Avenue
Mail Stop-6PDT
Dallas, Texas 75202

Allyn M. Davis, Director
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, TX 75202-2733

Mr. Stan Koop
Office of Attorney General
State of Oklahoma
2300 N. Lincoln Blvd., Suite 112
Oklahoma City, OK 73105-4894

Mr. Tim Thompson
Creek Nation of Oklahoma
Creek Nation Tribal Complex
Hwy 75, Loop 56
P.O. Box 586
Okmulgee, OK 74447

P. L. Bishop, Senior Environmental Specialist
Radiation Management Section
Waste Management Division
Department of Environmental Quality
State of Oklahoma
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

Mike Broderick, Radiation Control Program Director
Radiation Management Section
Waste Management Division
Department of Environmental Quality
State of Oklahoma
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

bcc w/enclosure (via ADAMS e-mail distribution):
LDWert
JTBuckley, NMSS/DWMEP
THYoungblood, NMSS/DWMEP
DBSpitzberg
BASchlapper
RJEvans
RRMuñoz
KEGardin
FCDB
RIV Nuclear Materials File - 5th Floor

SISP Review Completed: bas

ADAMS: : Yes 9 No Initials: bas

: Publicly Available 9 Non-Publicly Available 9 Sensitive : Non-Sensitive

DOCUMENT NAME: s:\dnms\!fcdb\!bas\50237703.wpd final r:_dnms

RIV:DNMS:FCDB	DNMS:NMIB	FCDB	C:FCDB
BASchlapper	RRMuñoz	RJEvans	DBSpitzberg
/RA/	***/RA/***	***/RA// BASchlapper for***	***/RA/***
07/26/05	07/26/05	07/28/05	07/28/05

OFFICIAL RECORD COPY T=Telephone E=E-mail F=Fax

ENCLOSURE

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	040-02377
License No.:	STB-472 (Terminated in March 1971)
Report No.:	040-02377/05-003
Property Owner:	Kaiser Aluminum & Chemical Corporation
Facility:	Former Kaiser Aluminum Specialty Products Facility
Location:	7311 East 41st Street Tulsa, Oklahoma 74145
Inspection Dates:	May 2 - 3, 2005 June 2, 2005 June 20 - 22, 2005
Inspectors:	Robert Evans, Senior Health Physicist Fuel Cycle & Decommissioning Branch Rick R. Muñoz, Health Physicist Nuclear Materials Inspection Branch Beth Schlapper, Health Physicist Fuel Cycle & Decommissioning Branch
Approved By:	D. Blair Spitzberg, Ph.D., Chief Fuel Cycle & Decommissioning Branch
Attachments:	Supplemental Inspection Information

EXECUTIVE SUMMARY

Former Kaiser Aluminum Specialty Products Plant
NRC Inspection Report 040-02377/05-003

This was an inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by Standard Magnesium Company. This inspection consisted of confirmatory surveys of survey units in both the pond parcel area, the Former Operational Area (FOA), and concrete slabs removed from the FOA. The inspectors also conducted a followup review of previous inspection findings.

Closeout Inspection and Survey

- Independent confirmatory radiological surveys were conducted by the inspectors in three final status survey units. Results of confirmatory surveys were generally consistent with measurements taken by Kaiser. Twenty-five soil samples were collected and analyzed for uranium and thorium concentrations. The soil samples tended to fall within statistical agreement, and the related NRC Inspection Followup Item was closed. One soil sample result exceeded the wide area derived concentration guideline limit for soil in the pond parcel area but was below the respective elevated measurement comparison derived concentration guideline limit criteria. Therefore, this sample result was determined to be acceptable with no further action required (Section 1).

- During the confirmatory survey of pond parcel area FSS-015, the inspectors noted that surface contamination levels were higher on flat, horizontal ledges as compared to vertical surfaces. A previously identified NRC Inspection Followup Item on this issue remains open pending further concrete sample measurements and technical review of the issue by NRC (Section 1a).

- Confirmatory surveys of concrete slabs removed from the FOA were performed. The surveys did not identify any surface areas that exceeded the free release criteria of 230 dpm/100cm^2 (Section 1d).

Followup

- Three previously identified NRC followup items and one notice of deviation were reviewed during the inspection. The current status of the notice of deviation and two inspection followup items were discussed with Kaiser and were closed; a third inspection followup item remains open (Section 2).

Report Details

Summary of Site Status

Since the previous inspection, Kaiser continued to conduct Phase II decommissioning of the site in accordance with the NRC-approved Decommissioning Plan (DP). Kaiser had completed the remediation of 15 survey units in the pond parcel area and excavated approximately 77,000 tons of contaminated soil and dross. Five survey units in the Former Operational Area (FOA) have also been completed. As of June 21, 2005, Kaiser has successfully shipped 381 rail gondola cars amounting to more than 37,000 tons of material to an offsite disposal site. Kaiser also plans to dispose of the concrete slabs from foundations of buildings previously located in the FOA at a local landfill.

1 Closeout Inspection and Survey (83890)

1.1 Scope

The inspectors performed confirmatory surveys to verify if Kaiser was remediating and decontaminating the site to acceptable radiological levels for unrestricted release.

1.2 Observations and Findings

a. Pond Parcel Area Survey Unit FSS-015

Final status survey unit FSS-015 was located in the northeastern corner of the pond parcel area. The survey unit was 2,074 m^2 in size. Included within this survey unit were excavated grounds, dirt walls and concrete surfaces. The confirmatory survey consisted of gamma scans of the soil surface, alpha and beta surface scans of concrete structures, and collection of soil and concrete swipe samples.

The inspectors performed the gamma radiation level scans of the soil surfaces using a Ludlum Model 18 survey meter (NRC No. 012778, calibration due date of November 10, 2005) with a SPA-3 scintillation probe assembly (NRC No. 20795G). A site background of 10,000 cpm was established. The background in this specific survey unit varied from 13,000 cpm to 20,000 cpm because of its proximity to areas still containing contaminated soil and dross material. The soil surface survey measurements ranged from 13,000 cpm to 35,000 cpm. Based on information provided in the draft final status survey report, Kaiser's survey results ranged from 8,158 cpm to 40,510 cpm with an average survey unit background of 18,450 cpm.

The inspectors performed a gamma scan of FSS-015, in part, to identify locations for soil sampling based on any elevated readings detected. Four areas were selected for sampling. The samples were collected and split onsite using in-situ mixing. The four soil samples were transferred through chain-of-custody records to Oak Ridge Institute for Science and Education (ORISE) for analysis. The samples were analyzed by gamma spectroscopy for uranium and thorium concentrations. The sample results are listed in Table 1 below:

Table 1
Concentrations of Uranium and Thorium Isotopes
In Survey Unit FSS-015 Soil Samples

NRC Region IV Sample ID	Radionuclide Concentrations [a,d] (pCi/g wet weight)						
	U-238	U-235	Total U [b]	Th-230	Th-228	Th-232	Total Th [c]
NRC-05-03-01	1.06 ± 0.63	0.01 ± 0.11	2.13 ± 0.90	1.5 ± 4.1	0.97 ± 0.09	0.80 ± 0.20	1.77 ± 0.22
NRC-05-03-02	1.00 ± 0.77	0.05 ± 0.13	2.1 ± 1.1	1.9 ± 4.9	1.18 ± 0.13	1.10 ± 0.22	2.28 ± 0.26
NRC-05-03-03	1.02 ± 0.63	-0.02 ± 0.11	2.02 ± 0.90	0.3 ± 4.7	1.01 ± 0.10	1.10 ± 0.20	2.11 ± 0.22
NRC-05-03-04	0.79 ± 0.63	0.00 ± 0.12 [e]	1.58 ± 0.90	2.4 ± 4.2	1.17 ± 0.13	1.01 ± 0.18	2.18 ± 0.22

[a] The average MDCs for these radionuclides ranges from 0.07 pCi/g for Th-228 by Pb-212 to 10 pCi/g for Th-230
[b] Total uranium is the sum of (2*U-238) + U-235
[c] Total Thorium is the sum of Th-228 and Th-232
[d] Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties
[e] Zero value is due to rounding

The NRC-approved wide area derived concentration guideline level ($DCGL_W$) for thorium-232 in soil in the stockpile and processing areas is 3.0 pCi/g with a background of 1.1 pCi/g. All thorium-232 sample results were less than the NRC approved $DCGL_W$.

As part of the final status survey process, Kaiser collected ten soil samples from this survey unit. The minimum number of samples required to be collected was nine. Kaiser submitted nine of the samples based on the highest field measurements to a state-licensed laboratory for analysis. The inspector's noted that Kaiser's sample results ranged from 0.687 ± 0.091 to 1.240 ± 0.129 pCi/g.

During the confirmatory survey, Kaiser collected and split four samples with the NRC. One of four samples was analyzed by Kaiser's contract laboratory. The comparison of the thorium-232 sample results are provided in Table 2 below:

Table 2
Comparison Of Split Soil Samples by Gamma Spectroscopy In Survey Unit FSS-015
Th-232 by Ac-228, including background (1.1 pCi/g)

Sample ID		Sample Location	NRC Analysis (Wet) pCi/g*	NRC (Wet) % Moisture	Kaiser Analysis (Wet) pCi/g	Kaiser % Moisture
NRC - RIV	Kaiser					
NRC 05-03-01	K-631	FSS-015	0.80 ± 0.20	11	N/A	N/A
NRC 05-03-02	K-632	FSS-015	1.10 ± 0.22	10	N/A	N/A
NRC 05-03-03	K-633	FSS-015	1.10 ± 0.20	8.5	0.808 ± 0.075	12.6
NRC05-03-04	K-634	FSS-015	1.01 ± 0.18	13	N/A	N/A

*Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

During a previous inspection, the NRC noted that Kaiser's soil sample results were not always statistically similar to ORISE's sample results. This issue was identified as an

NRC Inspection Followup Item (IFI 040-02377/0402-01). During this site inspection, Kaiser split four samples with the NRC but elected to submit only one sample result to its contract laboratory. The inspectors noted that Kaiser's sample result (0.808 ± 0.075 pCi/g) was slightly lower than the corresponding ORISE sample result (1.10 ± 0.18 pCi/g) but was still less than the NRC approved $DCGL_W$.

The NRC conducted surface surveys of concrete structures in the survey unit. The concrete structures included a concrete support structure (pier) of the bridge and a sanitary sewer manhole. The surveys were conducted using an Eberline E600 survey meter (NRC No. 063472, calibration due date of December 8, 2005) with an Eberline SHP-380AB (NRC No. 072357) alpha-beta probe. The surveys included surface scans for gross alpha and beta radioactivity, 1-minute static measurements, and swipe sampling for removable contamination.

Background measurements were obtained from similar concrete located in an offsite area that was unimpacted by previous plant operations. Background measurements ranged from 48 - 135 dpm/100cm^2 with an average of 107 dpm/100cm^2.

The concrete structure surfaces were scanned for potential alpha and beta contamination to locate areas of elevated radioactivity. Fifteen 1-minute alpha particle counts were obtained in areas exhibiting elevated scan measurements for comparison to the NRC-approved gross alpha-DCGL (GA-DCGL) of 21.5 dpm/100 cm^2. The static measurements included both fixed and removable alpha contamination on the surfaces. The gross alpha particle measurements ranged from 39 dpm/100 cm^2 to 164 dpm/100 cm^2. Based on information provided in the draft final status survey report, Kaiser collected ten static measurements using a gas flow proportional counter. The gross alpha survey results ranged from 4 to 155 dpm/100cm^2.

During the inspection, IFI 040-02377/0403-01 regarding structural surface acceptance criteria was discussed due to exceedances of the $DCGL_W$ for the concrete pier and manhole cover. In response to IFI 040-02377/0403-01, Kaiser submitted a request for DP amendment for revised structural acceptance criteria by letter dated May 5, 2005. The DP amendment requested a site specific GA-DCGL for structures remaining onsite of 944 dpm/100 cm^2 total contamination with 94.4 dpm/100 cm^2 removable contamination. The DP amendment also clarified the free release criteria for structures removed from the site as 230 dpm/100 cm^2 total average contamination with 700 dpm/100 cm^2 maximum contamination and 50 dpm/100 cm^2 removable contamination. NRC approved the DP amendment by letter dated June 22, 2005. Therefore, IFI 040-02377/0403-01 is closed.

During the confirmatory survey of the concrete structures in survey unit FSS-015, the inspectors noted that the scan and static survey results were higher for horizontal concrete ledges as compared to adjacent vertical concrete surfaces. The horizontal ledges averaged 64 dpm/100 cm^2 while the vertical ledges averaged 105 dpm/100 cm^2. NRC Inspection Followup Item (IFI 040-02377/0502-01) remains open pending additional measurements of the count rate discrepancy between horizontal and vertical surfaces and a further technical review by NRC.

The NRC collected swipe samples from five locations on the concrete structure surfaces in FSS-015. The samples were analyzed by ORISE for removable contamination based on the recently approved GA-DCGL for removable contamination of 94.4 dpm/100 cm^2. None of the swipe sample results exceeded the laboratory minimum detectable concentration of 8.9 dpm per swipe sample. In summary, neither Kaiser's nor NRC's concrete sample results exceeded the recently approved GA-DCGL for structures remaining onsite of 944 dpm/100cm^2 with a removable contamination 94.4 dpm/100 cm^2 for removable contamination.

b. Pond Parcel Area Survey Unit FSS-016

Final status survey unit FSS-016 was located in the northeastern portion of the pond parcel area, just north of the flux building. The survey unit was 3,040 m^2 in size. Included within this survey unit were excavated grounds and dirt walls. The confirmatory survey consisted of gamma scans of the soil surface and collection of soil samples.

The inspectors performed the gamma radiation level scans of the soil surfaces using a Ludlum Model 18 survey meter with a SPA-3 scintillation probe assembly. A site background of 10,000 cpm was established. The background in this specific survey unit varied from 13,000 cpm to 40,000 cpm because of its proximity to areas still containing contaminated soil and dross material. The soil surface survey measurements ranged from 15,000 cpm to 100,000 cpm. Based on information provided in the draft final status survey report, Kaiser's survey results ranged from 19,511 cpm to 62,000 cpm with an average survey unit background of 27,523 cpm.

Kaiser's draft final status survey report also identified areas of elevated measurements on the dirt wall adjacent to the neighboring property. The elevated measurement comparison process for the $DCGL_{EMC}$ and associated area factors for open land areas from Chapter 14 of the DP was implemented by Kaiser for the dirt wall.

During this inspection, the inspectors performed in-process split soil sampling at fourteen predetermined MARRSIM (Multi-Agency Radiation Survey and Site Investigation Manual) locations. Additionally, six biased soil samples were collected based on elevated readings detected during a gamma scan of FSS-016. The samples were collected and split onsite using in-situ mixing. The twenty soil samples were transferred through chain-of-custody records to ORISE for analysis. The samples were analyzed by gamma spectroscopy for uranium and thorium concentrations. The sample results are listed in Table 3 below:

Table 3
Concentrations of Uranium and Thorium Isotopes
In Survey Unit FSS-016 Soil Samples

NRC Region IV Sample ID	Radionuclide Concentrations [a,d] (pCi/g wet weight)						
	U-238	U-235	Total U [b]	Th-230	Th-228	Th-232	Total Th [c]
NRC-05-03-06	0.67 ± 0.53	0.15 ± 0.14	1.49 ± 0.76	0.5 ± 3.8	0.95 ± 0.09	1.09 ± 0.15	2.04 ± 0.17
NRC-05-03-07	0.59 ± 0.58	0.04 ± 0.11	1.22 ± 0.83	4.0 ± 4.8	1.74 ± 0.15	1.97 ± 0.22	3.71 ± 0.27
NRC-05-03-08	0.67 ± 0.59	0.07 ± 0.11	1.41 ± 0.84	-2.6 ± 3.5	0.95 ± 0.10	1.08 ± 0.19	2.03 ± 0.21
NRC-05-03-09	0.32 ± 0.84	0.26 ± 0.20	0.9 ± 1.2	11.6 ± 9.2	4.12 ± 0.30	4.06 ± 0.44	8.18 ± 0.53
NRC-05-03-10	0.92 ± 0.82	0.08 ± 0.13	1.9 ± 1.2	-2.3 ± 5.1	1.08 ± 0.10	1.16 ± 0.25	2.24 ± 0.27
NRC-05-03-11	0.87 ± 0.63	0.09 ± 0.12	1.83 ± 0.90	-0.6 ± 4.6	0.93 ± 0.09	1.08 ± 0.17	2.01 ± 0.19
NRC-05-03-12	1.03 ± 0.58	0.17 ± 0.14	2.23 ± 0.83	1.7 ± 4.6	0.82 ± 0.08	0.77 ± 0.20	1.59 ± 0.22
NRC-05-03-13	1.27 ± 0.69	0.00 ± 0.12	2.5 ± 1.0	-0.1 ± 4.0	1.12 ± 0.12	1.04 ± 0.19	2.16 ± 0.22
NRC-05-03-14	0.59 ± 0.44	-0.02 ± 0.09	1.16 ± 0.63	2.1 ± 3.7	0.69 ± 0.07	0.78 ± 0.15	1.47 ± 0.17
NRC-05-03-15	0.93 ± 0.73	0.02 ± 0.12	1.9 ± 1.0	3.1 ± 5.5	1.19 ± 0.11	1.15 ± 0.21	2.34 ± 0.24
NRC-05-03-16	0.91 ± 0.63	-0.03 ± 0.11	1.79 ± 0.90	2.5 ± 4.5	1.01 ± 0.10	1.01 ± 0.18	2.02 ± 0.21
NRC-05-03-17	0.74 ± 0.48	0.12 ± 0.14	1.60 ± 0.69	-0.5 ± 3.9	0.82 ± 0.09	0.92 ± 0.15	1.74 ± 0.17
NRC-05-03-18	0.53 ± 0.43	-0.10 ± 0.10	0.96 ± 0.62	-1.2 ± 3.9	0.69 ± 0.08	0.86 ± 0.15	1.55 ± 0.17
NRC-05-03-19	0.52 ± 0.48	0.07 ± 0.10	1.11 ± 0.69	-0.1 ± 3.5	0.80 ± 0.08	0.80 ± 0.14	1.60 ± 0.16
NRC-05-03-20	0.34 ± 0.59	0.00 ± 0.10	0.68 ± 0.84	-0.9 ± 3.3	0.84 ± 0.09	0.81 ± 0.16	1.65 ± 0.18
NRC-05-03-21	1.60 ± 1.00	0.29 ± 0.33	3.5 ± 1.5	24.1 ± 9.1	7.14 ± 0.50	7.33 ± 0.68	14.47 ± 0.84
NRC-05-03-22	0.63 ± 0.62	0.04 ± 0.13	1.30 ± 0.89	0.8 ± 4.1	1.19 ± 0.12	1.31 ± 0.22	2.50 ± 0.25
NRC-05-03-23	0.96 ± 0.59	0.05 ± 0.12	1.97 ± 0.84	-1.8 ± 4.1	0.99 ± 0.11	1.10 ± 0.18	2.09 ± 0.21
NRC-05-03-24	1.02 ± 0.73	0.12 ± 0.11	2.2 ± 1.0	0.2 ± 4.4	0.94 ± 0.09	0.96 ± 0.16	1.90 ± 0.18
NRC-05-03-25	1.23 ± 0.71	0.09 ± 0.16	2.6 ± 1.0	9.0 ± 8.2	4.82 ± 0.44	5.06 ± 0.45	9.88 ± 0.63

[a] The average MDCs for these radionuclides ranges from 0.07 pCi/g for Th-228 by Pb-212 to 10 pCi/g for Th-230
[b] Total uranium is the sum of (2*U-238) + U-235
[c] Total Thorium is the sum of Th-228 and Th-232
[d] Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

The NRC-approved $DCGL_W$ for thorium-232 in soil in the stockpile and processing areas is 3.0 pCi/g with a background of 1.1 pCi/g. As discussed below, two sample results (NRC-05-03-21 and NRC-05-03-25) exceeded the NRC approved $DCGL_W$.

As part of the final status survey process, Kaiser collected fourteen soil samples from this survey unit which were split with the inspectors (NRC-05-03-06 to NRC-05-03-19). The minimum number of samples required to be collected was fourteen. Kaiser submitted all of the samples to a state-licensed laboratory for analysis.

During the side-by-side survey, Kaiser collected and split the fourteen MARSSIM requried samples, and six additional biased samples with the NRC. All of the MARSSIM samples and one of six biased samples were analyzed by Kaiser's contract laboratory. The comparison of the thorium-232 sample results are provided in Table 4 below:

Table 4
Comparison Of Split Soil Samples by Gamma Spectroscopy In Survey Unit FSS-016
Th-232 by Ac-228, including background (1.1 pCi/g)

Sample ID		Sample Type	NRC Analysis (Wet) pCi/g*	NRC (Wet) % Moisture	Kaiser Analysis (Wet) pCi/g	Kaiser % Moisture
NRC - RIV	Kaiser					
NRC-05-03-06	K-743	MARSSIM	1.09 ± 0.15	16	0.751 ± 0.115	16.3
NRC-05-03-07	K-744	MARSSIM	1.97 ± 0.22	19	1.66 ± 0.092	20.0
NRC-05-03-08	K-742	MARSSIM	1.08 ± 0.19	20	0.939 ± 0.102	20.4
NRC-05-03-09	K-741	MARSSIM	4.06 ± 0.44	21	3.55 ± 0.132	22.9
NRC-05-03-10	K-740	MARSSIM	1.16 ± 0.25	12	1.16 ± 0.116	12.9
NRC-05-03-11	K-739	MARSSIM	1.08 ± 0.17	13	0.838 ± 0.142	12.3
NRC-05-03-12	K-737	MARSSIM	0.77 ± 0.20	14	0.555 ± 0.131	15.6
NRC-05-03-13	K-732	MARSSIM	1.04 ± 0.19	8.5	1.03 ± 0.116	10.6
NRC-05-03-14	K-733	MARSSIM	0.78 ± 0.15	15	0.727 ± 0.064	17
NRC-05-03-15	K-734	MARSSIM	1.15 ± 0.21	15	1.05 ± 0.115	13.3
NRC-05-03-16	K-731	MARSSIM	1.01 ± 0.18	13	0.921 ± 0.090	11.8
NRC-05-03-17	K-735	MARSSIM	0.92 ± 0.15	22	0.712 ± 0.076	22.3
NRC-05-03-18	K-736	MARSSIM	0.86 ± 0.15	20	0.724 ± 0.056	20.2
NRC-05-03-19	K-738	MARSSIM	0.80 ± 0.14	20	1.22 ± 0.075	22.7
NRC-05-03-20	K-745	Biased	0.81 ± 0.16	16	N/A	N/A
NRC-05-03-21	K-746	Biased	7.33 ± 0.68	21	5.76 ± 0.239	19.1
NRC-05-03-22	K-747	Biased	1.31 ± 0.22	12	N/A	N/A
NRC-05-03-23	K-748	Biased	1.10 ± 0.18	13	N/A	N/A
NRC-05-03-24	K-749	Biased	0.96 ± 0.16	15	N/A	N/A
NRC-05-03-25	K-750	Biased	5.06 ± 0.45	22	N/A	N/A

*Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

As noted in the above table, Kaiser's sample result (K-746) and NRC's sample result (NRC-05-03-21) exceeded the $DCGL_W$ of 3.0 pCi/g. During discussions with Kaiser representatives on July 12, 2005, Kaiser identified two elevated measurement comparison areas located on the northeastern wall adjacent to neighboring property that included sample K-746, as well as other biased samples taken by Kaiser. The two

areas, identified as EM1 and EM2 in FSS-016, were approximately 1 m^2 and 21 m^2, respectively, and when the area factors were applied, the sample result remained below the $DCGL_{EMC}$ of 37.5 pCi/g and 8 pCi/g, respectively. Kaiser also explained that additional remediation of the area was not desirable because of its location adjacent to neighboring property and the safety concerns associated with further remediation underneath the neighboring property's concrete storage area. Further, remediation was unnecessary if the area factors were applied to the sample result as allowed by Section 14 of the DP. The NRC acknowledged Kaiser's position during the conversation and agreed that all sample results were below the respective $DCGL_W$ or $DCGL_{EMC}$ values, as appropriate.

Also noted in the above table, NRC's sample result for sample NRC-05-03-25 exceeded the $DCGL_W$ of 3.0 pCi/g. During discussions with Kaiser representatives on July 12, 2005 regarding elevated areas in the survey unit, Kaiser informed NRC that additional remediation had been performed in the trench area encompassing this sample result. Kaiser performed analysis on four additional soil samples collected in the vicinity of NRC's sample result following remediation, and the results were less than 1.0 pCi/g.

During a previous inspection, the NRC noted that Kaiser's soil sample results were not always statistically similar to ORISE's sample results. This issue was identified as an NRC Inspection Followup Item (IFI 040-02377/0402-01). During this inspection, Kaiser split twenty samples with the NRC and submitted all but five samples to its contract laboratory for analysis. The inspectors noted that Kaiser's sample results, taking into account all fifteen samples submitted, statistically correspond to NRC's contract laboratory sample analysis. This IFI is closed, although future sample results will continue to be compared between the two laboratories.

c. Former Operational Area Final Survey Unit FSS FOA-005

The NRC inspectors conducted confirmatory surveys in Former Operational Area survey unit FSS FOA-005. FSS FOA-005 was located in the southeastern portion of the FOA. The survey unit was 1,320 m^2 in size. Included within this survey unit were excavated grounds and dirt walls. The confirmatory survey consisted of gamma scans of the soil surface and collection of a soil sample.

The inspectors performed the gamma radiation level scans of the soil surfaces using a Ludlum Model 18 survey meter with a SPA-3 scintillation probe assembly. A site background of 10,000 cpm was established. Based on information provided in the draft final status survey report, Kaiser's survey results ranged from 11,415 cpm to 15,901 cpm with an average survey unit background of 13,217 cpm.

The inspectors performed a gamma scan of FSS FOA-005, in part, to identify locations for soil sampling based on any elevated readings detected. One area was selected for sampling. The sample was collected and split onsite using in-situ mixing. The soil sample was transferred through chain-of-custody records to ORISE for analysis. The sample was analyzed by gamma spectroscopy for uranium and thorium concentrations. The sample result is listed in Table 5 below:

Table 5
Concentrations of Uranium and Thorium Isotopes
In Survey Unit FSS FOA-005 Soil Sample

NRC Region IV Sample ID	Radionuclide Concentrations [a,d] (pCi/g wet weight)						
	U-238	U-235	Total U [b]	Th-230	Th-228	Th-232	Total Th [c]
NRC-05-03-05	0.96 ± 0.79	0.03 ± 0.11	2.0 ± 1.1	-3.3 ± 4.6	1.04 ± 0.10	1.07 ± 0.17	2.11 ± 0.20

[a] The average MDCs for these radionuclides ranges from 0.07 pCi/g for Th-228 by Pb-212 to 10 pCi/g for Th-230
[b] Total uranium is the sum of (2*U-238) + U-235
[c] Total Thorium is the sum of Th-228 and Th-232
[d] Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

The NRC-approved $DCGL_W$ for thorium-232 in soil in the former operational area is also 3.0 pCi/g with a background of 1.1 pCi/g. The sample result was less than the NRC approved $DCGL_W$.

As part of the final status survey process, Kaiser collected nine soil samples from this survey unit. The minimum number of samples required to be collected was also nine. Kaiser submitted all of the samples to a state-licensed laboratory for analysis. The sample results ranged from 0.601±0.062 pCi/g to 1.120±0.1099 pCi/g.

During the confirmatory survey, Kaiser collected and split the sample with the NRC. This sample was analyzed by Kaiser's contract laboratory. The comparison of the thorium-232 sample result is provided in Table 6 below:

Table 6
Comparison Of Split Soil Sample by Gamma Spectroscopy In Survey Unit FSS FOA-005
Th-232 by Ac-228, including background (1.1 pCi/g)

Sample ID		Sample Location	NRC Analysis (Wet) pCi/g*	NRC (Wet) % Moisture	Kaiser Analysis (Wet) pCi/g	Kaiser % Moisture
NRC - RIV	Kaiser					
NRC 05-03-05	K-713	FSS FOA-005	1.07 ± 0.17	19	0.850 ± 0.084	16.6

*Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

The sample result for both Kaiser and NRC indicated that the sample was below the NRC approved $DCGL_W$.

d. Concrete slabs for off-site disposal

Confirmatory surveys were performed on concrete slabs planned for off-site disposal at a local landfill. The surveys were conducted using an Eberline E600 survey meter with an Eberline SHP-380AB alpha-beta probe. The surveys included surface scans for gross alpha and beta radioactivity, 1-minute static measurements, and swipe sampling for removable contamination.

Background measurements were obtained from similar concrete located in an offsite area that was unimpacted by previous plant operations. Background measurements ranged from 29 - 241 dpm/100cm^2 with an average of 125 dpm/100cm^2.

The DP amendment stated the free release criteria for structures removed from the site as 230 dpm/100 cm^2 total average contamination with 700 dpm/100 cm^2 maximum contamination and 50 dpm/100 cm^2 removable contamination. Kaiser had 138 concrete slabs that were surveyed for free release. Of the 138 slabs of concrete, seven had broken apart and were shipped off-site to a low level waste disposal facility. The inspectors performed confirmatory surveys on 27 of the 131 remaining concrete slabs. A 100-percent scan for alpha and beta radioactivity was performed on the seven concrete slabs that Kaiser identified during clearance surveys as having the highest gross alpha dpm/100cm^2 measurements. Additionally, the inspectors performed swipes to determine removable contamination on these seven slabs. An additional twenty concrete slabs were surveyed for potential gross alpha and beta radioactivity.

Three 1-minute alpha particle counts were obtained for each concrete slab for comparison to the NRC-approved average gross alpha DCGL of 230 dpm/100 cm^2. The static measurements included both fixed and removable alpha contamination on the surfaces. The gross alpha particle measurements ranged from 10 dpm/100 cm^2 to 222 dpm/100 cm^2.

The NRC collected swipe samples from seven concrete slabs. The samples were analyzed by ORISE for removable contamination based on the recently approved GA-DCGL for removable contamination of 50 dpm/100 cm^2 for free release. None of the swipe sample results exceeded the laboratory minimum detectable concentration of 8.9 dpm per swipe sample. In summary, neither Kaiser's nor NRC's concrete sample results exceeded the NRC-approved GA-DCGL for structures for free release of 230 dpm/100 cm^2 total average contamination with 700 dpm/100 cm^2 maximum contamination and 50 dpm/100 cm^2 removable contamination.

1.3 Conclusion

Independent confirmatory radiological surveys were conducted by the inspectors in three final status survey units. Results of confirmatory surveys were generally consistent with measurements taken by Kaiser. Twenty-five soil samples were collected and analyzed for uranium and thorium concentrations. The soil samples tended to fall within statistical agreement, and the related NRC inspection followup item was closed. One soil sample result exceeded the $DCGL_W$ for soil in the pond parcel area but was below the respective $DCGL_{EMC}$ criteria. Therefore, this sample result was determined to be acceptable with no further action.

During the confirmatory survey of concrete areas in Pond Parcel Area FSS-015, the inspectors noted that surface contamination levels were higher on flat, horizontal ledges as compared to vertical surfaces. An NRC inspection followup item remains open pending further concrete sample measurements.

Confirmatory surveys of concrete slabs removed from the FOA were performed. The surveys did not identify any areas that exceeded the free release criteria of 230 dpm/100cm^2.

2 Followup

The inspectors reviewed and discussed Notice of Deviation (NOD) 040-02377/0501-01 with Kaiser. Previously, Kaiser failed to effectively implement certain aspects of its corrective action program as required by Section 13.6, Corrective Action, of the DP, and Procedure KAI-11, Procedure to Investigate and Rectify Items of Nonconformance. Additionally, Kaiser was not consistently documenting investigations of nonconformance when identifying the root causes as required by Section 5.0 of KAI-11. Kaiser formally responded to this NOD by letter dated April 29, 2005. Kaiser committed to diligently pursue corrective action when a nonconformance was identified, as well as providing training to staff onsite regarding the procedure. The inspectors reviewed the onsite training, and had further discussions with Kaiser regarding implementation of Procedure KAI-11. Therefore this NOD is closed.

During the inspection, IFI 040-02377/0403-01 regarding structural surface acceptance criteria, was discussed due to exceedances of the DCGL for the concrete pier and manhole cover. In response to IFI 040-02377/0403-01, Kaiser submitted a request for DP amendment for revised structural acceptance criteria by letter dated May 5, 2005. The DP amendment requested a site specific GA-DCGL for structures remaining onsite of 944 dpm/100 cm^2 total contamination with 94.4 dpm/100 cm^2 removable contamination. The DP amendment also clarified the free release criteria for structures removed from the site as 230 dpm/100 cm^2 total average contamination with 700 dpm/100 cm^2 maximum contamination and 50 dpm/100 cm^2 removable contamination. NRC approved the DP amendment by letter dated June 22, 2005. Also, as discussed in NRC Inspection Report 040-02377/05-002, Kaiser also requested reclassification of the flux building. The reclassification of the flux building was also approved by the letter dated June 22, 2005. IFI 040-02377/0403-01 is closed.

The inspectors reviewed and discussed IFI 040-02377/0402-01, regarding statistical biasing between split samples with Kaiser. The results of confirmatory surveys and split sampling during this inspection provided a further understanding of sample comparisons, and the samples fell within statistical agreement. This IFI is closed.

IFI 040-02377/0502-01 was discussed during the inspection, and additional measurements were taken on the concrete pier and manhole cover. Again, the inspectors observed that horizontal surfaces exhibited elevated count rate measurements as compared to the adjacent vertical surfaces. This issue continues to be tracked as an IFI pending additional measurements and review of the discrepancy in count rates between horizontal and vertical surface measurements.

3 Exit Meeting Summary

The inspectors reviewed the scope and findings of the inspection during a preliminary exit briefing that was conducted on June 22, 2005, at the conclusion of the onsite inspection. A telephonic discussion of the confirmatory survey results was conducted with Kaiser via telephone on July 25, 2005. Kaiser did not identify as proprietary any information provided to, or reviewed, by the inspectors.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Kaiser Aluminum & Chemical Corp.

Bill Vinzant, Program Manager
P. Handa, Site Administrator, Kaiser Aluminum & Chemical Corp.
L. Max Scott, Radiation Safety Officer

Penn E&R

David Weyant, Data Manger
David Duffey, HP Technician

Civil & Environmental Consultants, Inc.

Andy Lombardo, Final Survey Oversight

ReCon

Jerry Pionesa, QA Manager
Joel Nowack, HP Technician
Danny P. Brown, Project Manager
Tyrone Trent, HP Technician
Jeremy Buchheit, Health and Safety Manager

INSPECTION PROCEDURES USED

IP 83890	Closeout Inspection and Survey
IP 92701	Followup

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Closed

NOD 040-02377/0501-01	Kaiser failed to effectively implement certain aspects of their corrective action program as required by Section 13.6, Corrective Action, of the DP, and Procedure KAI-11, Procedure to Investigate and Rectify Items of Nonconformance. Additionally, Kaiser was not consistently documenting investigations of nonconformances when identifying the root causes as required by Section 5.0 of KAI-11. Kaiser formally responded to this NOD by letter dated April 29, 2005. Therefore, this NOD is closed.

Closed

IFI 040-02377/0403-01	Acceptance criteria for structure as proposed by Kaiser and approved by NRC is not easily detectable by field instrumentation. In response to IFI 040-02377/04-01, Kaiser submitted a request for DP amendment that requested a site specific Gross Alpha(GA)-DCGL for structures remaining onsite. The DP amendment also clarified the free release criteria for structures removed from the site as 230 dpm/100 cm^2 total average contamination with 700 dpm/100 cm^2 maximum contamination and 50 dpm/100 cm^2 removable contamination. NRC approved the DP amendment by letter dated June 22, 2005. Therefore, IFI 040-02377/0403-01 is closed.

Closed

IFI 040-02377/0402-01	As a followup to IFI 040-02377/0402-01, split soil sample result comparisons indicated that Kaiser's contract laboratory thorium-232 results statistically correspond to ORISE laboratory results. Therefore, IFI 040-02377/0402-02 is closed.

Discussed

IFI 040-02377/0502-01	The inspectors observed that horizontal surfaces in the FOA, whether or not the area was classified as impacted, exhibited elevated count rate measurements as compared to the adjacent vertical surfaces. This issue is being tracked as an IFI pending Kaiser's review of the discrepancy in count rates between horizontal and vertical surface measurements.

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
cpm	counts per minute
$DCGL_{EMC}$	elevated measurement comparison derived concentration guideline level
$DCGL_W$	wide area derived concentration guideline level
DP	NRC-Approved Decommissioning Plan
FOA	Former Operational Area
FSS	Final Status Survey
IFI	Inspection Follow-up Item
IP	Inspection Procedure
pCi/g	picocuries per gram
dpm/100 cm^2	disintegrations per minute per 100 square centimeters
m^2	square meters
NOD	Notice of Deviation
ORISE	Oak Ridge Institute for Science and Education
MARRSIM	Multi-Agency Radiation Survey and Site Investigation Manual